FIGURE 1

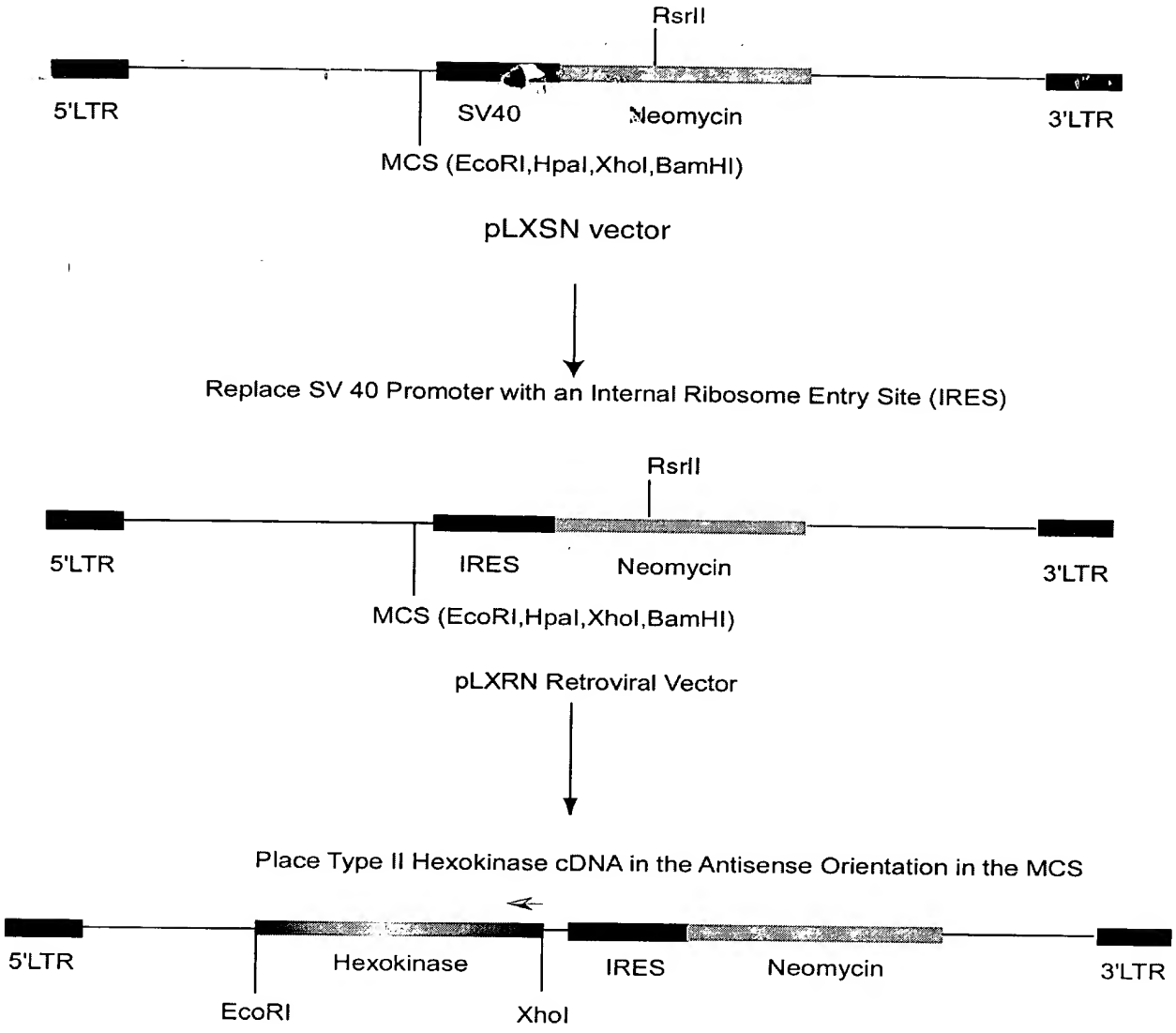

RsrII
5'LTR
SV40
Neomycin
3'LTR
MCS (EcoRI,HpaI,XhoI,BamHI)
pLXSN vector
Replace SV 40 Promoter with an Internal Ribosome Entry Site (IRES)
RsrII
5'LTR
IRES
Neomycin
3'LTR
MCS (EcoRI,HpaI,XhoI,BamHI)
pLXRN Retroviral Vector
Place Type II Hexokinase cDNA in the Antisense Orientation in the MCS
5'LTR
Hexokinase
IRES
Neomycin
3'LTR
EcoRI
XhoI

FIGURE 2

Legend:

— protein

Sequence:

1 MIASHMIACL FTELNQNQVQ KVDQFLYHMR LSDETLLEIS RRFRKEMEKG LGATTHPTAA

61 VKMLPTFVRS TPDGTEHGEF LALDLGGTNF RVLRVRVTDN GLQRVEMENQ IYAILEDIMR

121 GSGTQLFDHI AECLANFMDK LQIKEKKLPL GFTFSFPCHQ TKLDESFLVS WTKGFKSSGV

181 EGRDVVDLIR KVIQRRGDFD IDIVAVVNDT VGTMMTCGYD DQNCEIGLIV GTGSNACYME

241 EMRHIDMVEG DEGRMCINME WGAFGDDGTL NDIRTEFDRE IDMGSLNPGK QLFEKMISGM

301 YMGELVRLIL VKMAKAELLF QGKLSPELLT TGSFETKDVS DIEEDKDGIE KAYQILMRLG

361 LNPLQEDCVA THRICQIVST RSASLCAATL AAVLWRIKEN KGEERLRSTI GVDGSVYKKH

421 PHFAKRLHKA VRRLVPDCDV RFLRSEDGSG KGAAMVTAVA YRLADQHRAR QKTLESLKLS

481 HEQLLEVKRR MKVEMEQGLS KETHAVAPVK MLPTYVCATP DGTEKGDFLA LDLGGTNFRV

541 LLVRVRNGKR RGVEMHNKIY SIPQEVMHGT GEELFDHIVQ CIADFLEYMG MKGVSLPLGF

601 TFSFPCQQNS LDQSILLKWT KGFKASGCEG EDVVTLLKEA IHRREEFDLD VVAVVNDTVG

661 TMMTCGYEDP HCEVGLIVGT GSNACYMEEM RNVELVDGEE GRMCVNMEWG AFGDNGCLDD

721 LRTVFDVAVD ELSLNPGKQR FEKMISGMYL GEIVRNILID FTKRGLLFRG RISERLKTRG

781 ISETKFLSQI ESDCLALLQV RAILRHLGLE STCDDSIIVK EVCTVVARRA AQLCGAGMAA

841 VVDKIRENRG LDNPKVTVGV DGTLYKLHPH FAKVMHETVR DLAPKCDVSF LESEDGSGKG

901 AALITAVACR IREAGQR

FIGURE 3

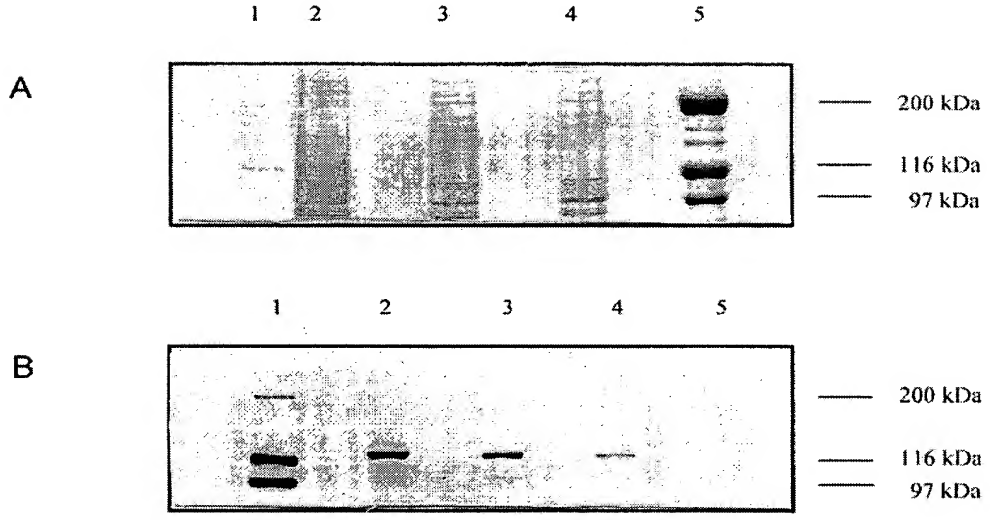
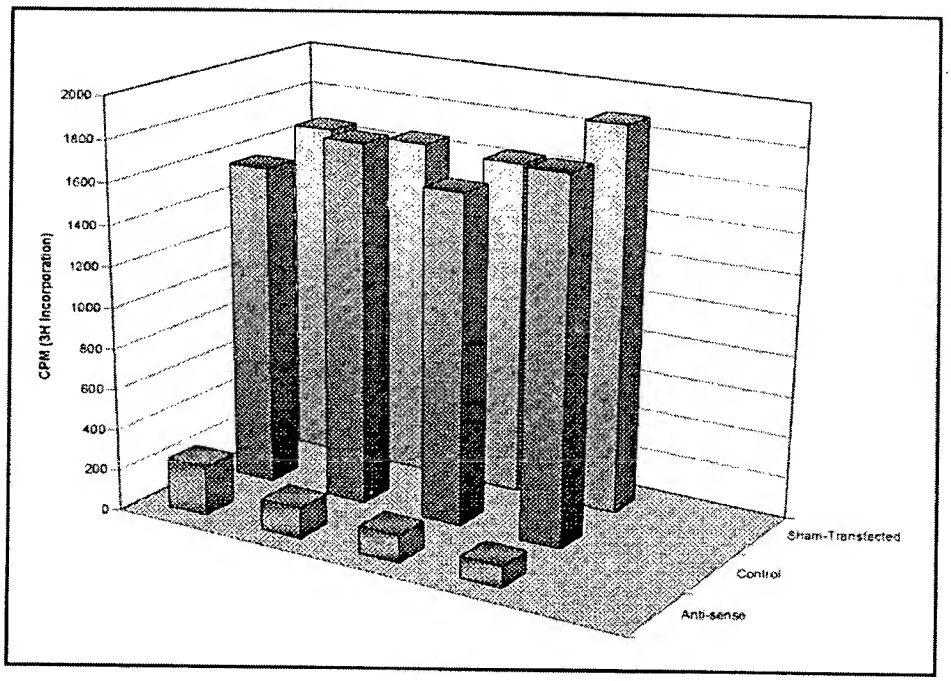


FIGURE 4


CPM (3H Incorporation)
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1800
1600
1400
1200
1000
800
600
400
200
0
Sham-Transfected
Control
Anti-sense

FIGURE 5

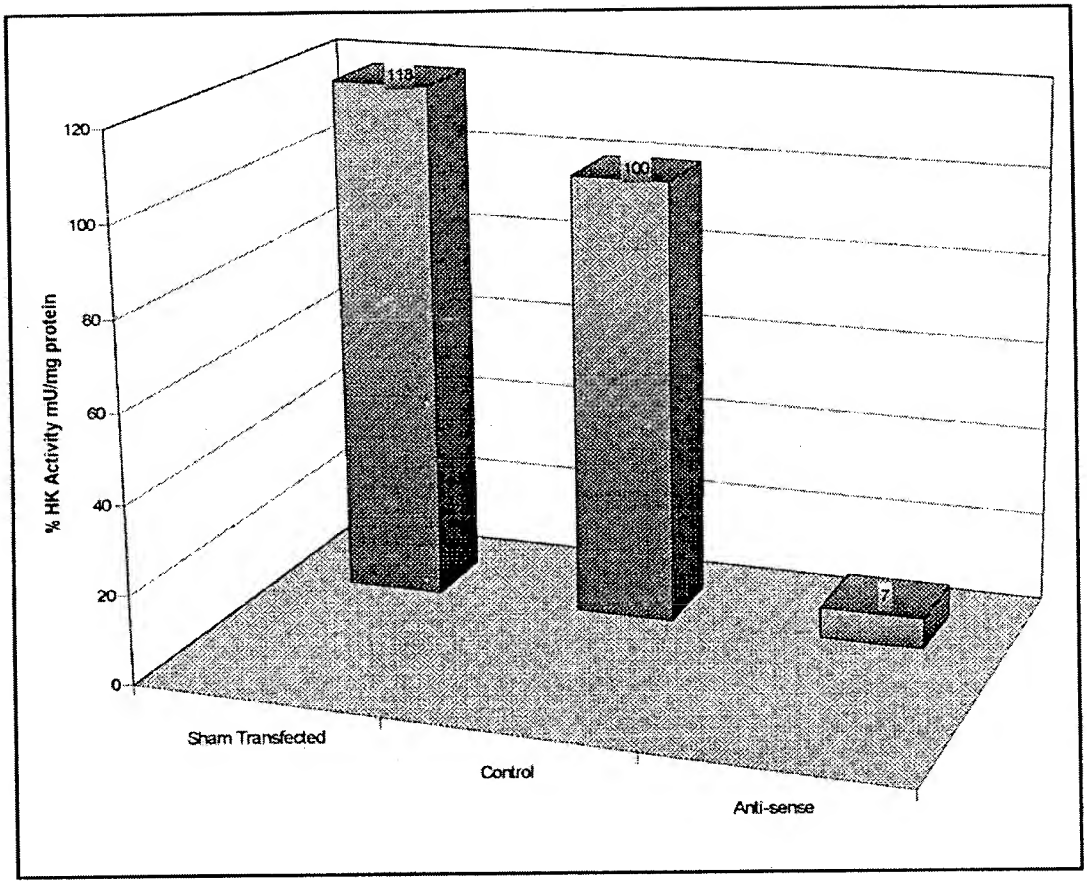
% HK Activity mU/mg protein
120
100
80
60
40
20
0
118
100
7
Sham Transfected
Control
Anti-sense

FIGURE 6

AF027179 **Rattus norvegicus mutant type II hexokinase mRNA, complete cds**

```
atgatcgcct cgcatatgat cgcctgctta ttcacggagc tcaaccaaaa ccaagtgcag 61
aaggttgacc aatttctcta ccacatgcgt ctctcagatg agacccttct ggagatttct 121
aggcggttcc ggaaggagat ggagaaaggg ctaggagcta ccacgcaccc tacagcagct 181
gtgaaaatgt tgcctacctt tgtgaggtca actccggatg ggacagaaca tggggagttc 241
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ggcctccaga gagtggagat ggagaaccag atctacgcca tccttgagga catcatgcgg 361
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acaaaactgg atgagagttt tttggtctcg tggactaagg ggttcaagtc cagtggcgtg 541
gaaggcagag atgtggtgga cctgatccgg aaggttatcc agcgcagagg ggactttgac 601
attgacattg tggccgtggt gaatgacaca gttgggacca tgatgacttg tggctatgat 661
gatcagaact gcgagattgg tctcattgtg ggcactggca gcaacgcctg ctacatggag 721
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aaggagacgc atgcggtcgc ccctgtgaag atgctgccca cttacgtgtg tgccactcca 1561
gatggcacag agaaaggaga cttcttggcc ttggatcttg gaggaacaaa cttccgggtc 1621
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gatctggctc cgaaatgtga cgtgtccttc ctggaatccg aggacggcag tgggaaggga 2701
gcagctctca tcactgccgt ggcctgccgc atccgggagg ctgggcagag atag
```

FIGURE 7A

AF113968 Cloning vector pLXRN, complete sequence

```
gaattgctag caattgctag caattgctag caattcatac cagatcaccg aaaactgtcc 61
tccaaatgtg tccccctcac actcccaaat tcgcgggctt ctgcctctta gaccactcta 121
ccctattccc cacactcacc ggagccaaag ccgcggccct tccgtttctt tgcttttgaa 181
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atacataact gagaatagaa aagttcagat caaggtcagg aacaaagaaa cagctgaata 301
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atcagttcgc ttctcgcttc tgttcgcgcg cttccgctct ccgagctcaa taaaagagcc 601
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```

FIGURE 7B

```
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aagtcattct gagaatagtg tatgcggcga ccgagttgct cttgcccggc gtcaacacgg 6001
gataataccg cgccacatag cagaacttta aaagtgctca tcattggaaa acgttcttcg
```

FIGURE 7C

```
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6181 ggaaggcaaa atgccgcaaa aaagggaata agggcgacac ggaaatgttg aatactcata
6241 ctcttccttt ttcaatatta ttgaagcatt tatcagggtt attgtctcat gagcggatac
6301 atatttgaat gtatttagaa aaataaacaa atagggggttc cgcgcacatt tccccgaaaa
6361 gtgccacctg acgtctaaga aaccattatt atcatgacat taacctataa aaataggcgt
6421 atcacgaggc cctttcgtct tcaa
```

FIGURE 8A

Accession Number NM_012734 for Rattus norvegicus Hexokinase 1 (Hk1), mRNA

```
cgccgatctg ccgctggagg accactgctc accagggcta ctgaggagcc actggcccca 61
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cttcaccgag ctgaaggatg accaagtcaa aaagattgac aagtatctgt acgccatgcg 181
gctctctgat gagattctga tagatatcct gacacgattc aagaaagaga tgaagaatgg 241
cctctcccgg gattataatc caacagcctc cgtcaagatg ctgcccacct tcgtccggtc 301
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taaagccatt aagaagcgag gggactatga tgctaacatt gtcgccgtgg tgaatgacac 721
agtagggacc atgatgacct gcggttatga tgaccaacag tgtgaagtcg gcctgatcat 781
tggcacaggc accaatgctt gctacatgga ggaactgcga cacatcgacc tggtggaagg 841
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ggaagacatc cgaaccgagt ttgacagaga gttagaccgt ggatctctca accctgggaa 961
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gatcaaaggc ccccggatgc ctctgggctt caccttctca tttccctgcc atcagacgaa 1921
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gaagaatgtg gagatggtgg aggggaacca gggccagatg tgcatcaaca tggagtgggg 2221
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cggagcacca cgtagaatac cacccagagc gcgtgtgctg ttgatctgat ctctcgcctg 3061
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```

FIGURE 8B

```
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```